Superfund Research Program

The Superfund Research Program (SRP) supports practical research that creates benefits, such as lower environmental cleanup costs and reduced risk of exposure to hazardous substances, to improve human health. SRP funds colleges, universities, and small businesses, including the Oregon State University Superfund Research Center (OSU SRC), to advance this work across the nation.

Research Highlights

Measuring tribal exposures that may raise cancer risk

Tipis are used for smoking salmon by the Confederated Tribes of the Umatilla Indian Reservation. (Photo courtesy of OSU SRC)

An OSU SRC study reported that exposure to polycyclic aromatic hydrocarbons (PAHs) from salmon smoked by traditional tribal methods, if consumed at high levels over many years, may increase cancer risks.[1] PAHs, which are associated with increased risk of certain cancers and other diseases, are byproducts of combustion, such as burning fuels, forest fires, and grilled foods, and are present in air, water, soil, and foods.[2] Collaborating with the Confederated Tribes of the Umatilla Indian Reservation, Anna Harding, Ph.D., Barbara Harper, Ph.D., and their teams measured PAHs and other exposures specific to tribal lifestyles.[3] The researchers also identified tribal-specific factors that may affect environmental exposures.[4] This information may help decision-makers at contaminated sites that directly affect tribal lands and resources.

Identifying genes involved in developmental toxicity

Using state-of-the-art technology, Robert Tanguay, Ph.D., and his team identified over a thousand genes in developing zebrafish that are affected by PAH exposure.[5] Zebrafish are a proven model for human development and disease. The team screened for changes in gene activity for the entire zebrafish genome, estimated to contain more than 26,000 genes.[6] Researchers are now working to understand how those changes may lead to adverse health effects in people.

Tanguay assesses the health of adult zebrafish. (Photo courtesy of OSU SRC)

Identifying novel compounds associated with PAHs

Researchers led by Staci Simonich, Ph.D., have discovered previously unknown types of nitrated PAHs that may be highly toxic.[7] The scientists identified chemical reactions that lead to formation of these newly identified chemicals, and found that they caused genetic damage in lab tests, suggesting the potential for causing cancer. OSU SRC researchers are measuring these and other PAHs at Superfund sites to find ways to reduce the amounts of these contaminants in the environment.

Oregon State University

An OSU SRC multidisciplinary team uses state-of-the-art techniques to better understand PAHs found in air, soil, water, and diet. They are studying how to measure exposure accurately, how PAHs affect development, and how to test for and clean up PAHs in the environment.

Center Contact:

Robert Tanguay, Ph.D.

Oregon State University

Department of Environmental and Molecular Toxicology

robert.tanguay@oregonstate.edu

541-737-6514

PO Box 12233 • Research Triangle Park, NC 27709
Phone: 919-541-3345 • **www.niehs.nih.gov**

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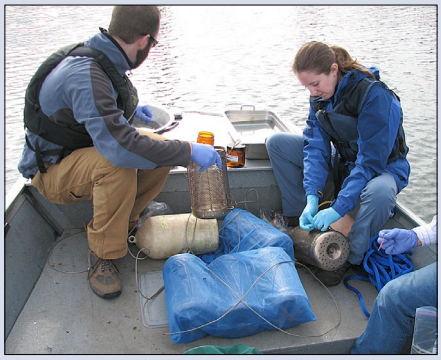
Sampling devices help predict exposure

Kim Anderson, Ph.D., and other OSU SRC researchers developed a new cost-effective method for estimating how much of the contaminants in water may be absorbed by crayfish and other aquatic organisms.[8] These contaminants can transfer to humans who eat seafood. The researchers conducted sample collections near the Portland Harbor Superfund Mega-site in Oregon. Combining sample measurements with mathematical modeling, the researchers were able to predict how much of the contaminants could potentially build up in aquatic organisms. This information may help scientists estimate human exposure and health risks based on measurements of contaminants in water.



Graduate students from Anderson's lab collect samples in the Portland Harbor. (Photo courtesy of OSU SRC)

Research overview

- Developing devices to measure the amount of contaminants that can be absorbed by living organisms, as well as the toxicity of PAH mixtures, to predict health risks. (Kim Anderson, Ph.D., kim.anderson@oregonstate.edu)
- Applying modeling techniques to understand human responses to different levels of individual contaminants, as well as mixtures. (Richard Corley, Ph.D., rick.corley@pnnl.gov)
- Identifying PAH breakdown products formed during cleanup processes in contaminated soils and sediments. (Staci Simonich, Ph.D., staci.simonich@oregonstate.edu)
- Understanding absorption and elimination of the PAH benzo(a)pyrene in humans, identifying susceptible individuals, and assessing health risks. (David Williams, Ph.D., david.williams@oregonstate.edu)
- Identifying neurodevelopmental and cardiovascular health effects of embryonic exposure to PAHs. (Robert Tanguay, Ph.D., robert.tanguay@oregonstate.edu)

Sharing results

- OSU SRC is translating scientific findings into effective and appropriate risk assessment strategies, to reduce environmental disparities and improve the health of Pacific Northwest tribes. (Anna Harding, Ph.D., anna.harding@oregonstate.edu)
- OSU SRC is facilitating the understanding and application of their research, by partnering with government agencies, and using Web technologies and social media to increase community and tribal awareness of Superfund sites and other issues related to hazardous waste contamination. (Justin Teeguarden, Ph.D., Pacific Northwest National Laboratory, justin.teeguarden@pnl.gov)

Other contributions to advance science

- The OSU SRC research support facility provides vital access to expertise, research resources, and state-of-the-art instrumentation for its research projects. (Kim Anderson, Ph.D., kim.anderson@oregonstate.edu; Katrina Waters, Ph.D., Pacific Northwest National Laboratory, katrina.waters@pnl.gov)
- The OSU SRC integrated, multidisciplinary training experience provides early-career scientists access to teams of diverse professionals, and encourages innovation to develop solution-oriented approaches to complex environmental health problems. (Craig Marcus, Ph.D., craig.marcus@oregonstate.edu)

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NIEHS Contacts:

William Suk, Ph.D.
Director
Superfund Research Program
suk@niehs.nih.gov
919-541-0797

Danielle Carlin, Ph.D.
Program Administrator
Superfund Research Program
danielle.carlin@nih.gov
919-541-1409

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For more information on the National Institute of Environmental Health Sciences, visit **www.niehs.nih.gov**.

For more information on the Superfund Research Program, visit **www.niehs.nih.gov/srp**.

For more information on the Oregon State University Superfund Research Center, visit **http://superfund.oregonstate.edu**.

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